VEGETATIVE GROWTH RATE TEST OF BOUGENVILE CUTTING AGAINST PLANT GROWTH REGULATION (PGR) AND MANURE APLLICATION IN POLYBAG

UJI LAJU PERTUMBUHAN VEGETATIF STEK BOUGENVILE TERHADAP PERLAKUAN ZAT PENGATUR TUMBUH (ZPT) DAN PUPUK KANDANG DI POLYBAG

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ABSTRACT

This research was conducted in Mentimun Street, Siumbut Baru Village, Kisaran Timur Subdistrict, Asahan Regency, North Sumatera Province. Study time from March to May 2017. This research was arranged based on Factorial Randomized Block Design with 2 treatment factors and 3 replications. The first factor is PGR with 4 levels: Z0 = without PGR, Z1 = Rootone F (2 g / l water), Z2 = Atonik (2 ml / l water) and Z3 = Hantu (2 ml / l water). The second factor is by giving the ratio of manure with 4 levels ie K0 = 1: 0 (1 part of soil + 0 parts of manure), K1 = 1: 1 (1 part of soil + 1 part manure), K2 = 2: 1 (2 part of soil + 1 part manure) and K3 = 3: 1 (3 parts of soil + 1 part manure). The results showed that the best treatment of PGR was obtained at PGR Rootone F which resulted in plant height 26,36 cm, leaf number 13,71 strand, stem diameter 5,29 mm, total live crop 3,75 crop. The treatment of manure on planting medium with a ratio of 2: 1 (soil: manure) is the best treatment that produce plant height 25.09 cm, the number of leaves 13.54 pieces, stem diameter 5.25 mm, the number of plants live 3.67 plants. Interaction between PGR and manure had no significant effect on all observed variables.

Key Words: vegetatife, growth rate, bougenvile cutting, PGR, manure

INTRODUCTION

Bougainvillea is one type of introduction plants that are favored by various groups, especially fans of ornamental plants. Bougenvil planting is increasingly rampant arranged in mini gardens around the house, moving gardens in the middle of the city and roads, collection of potted plants, and recreation areas. This shows that the development and preservation of bougainvillea plants is increasingly important for efforts to improve the quality of human life. The unique characteristic of bougainvillea in flowering is that in fertile soils and rainy seasons this flowering plant is less productive. On the contrary, in less fertile and dry soils, it will flower heavily, especially in the dry season (Messakh and Sudarma, 2007).

Cuttings are a vegetative artificial way of propagating plants by using parts of stems, roots or leaves of plants to be grown into new plants. As an alternative to artificial vegetative propagation, cuttings are more economical, easier, do not require special skills and are fast compared to artificial vegetative propagation methods (Tohir, 2013).

The percentage of successful propagation of bougainvillea through cuttings method is quite low because bougainvillea is a difficult rooted plant. According to Hartman et al., (2002) in Panjaitan (2014) not all types of plants can be bred with cuttings. Success by means of cuttings depends on the ability of the species to take root. There are types that are easy to root and some are difficult. The high lignin content and the presence of a continuous sclerenchymal ring are anatomical inhibitors of plant species that are difficult to root, by obstructing the place where adventitious roots emerge.

The success of cuttings in forming roots and shoots depends on auxin activity from shoots and leaves. The root growth regulator will induce and cause root production to increase. Plant Growth Regulatory Substances (PGR) are organic compounds that are not nutrients, and in small amounts encourage, inhibit, or regulate physiological processes in plants (Purdyaningsih, 2012).

In addition, so that the stem cuttings are easy to grow and become good seeds, it is necessary to pay attention to the seedling media used. The seedling media must be able to withstand moisture, but the aeration is sufficient. The media must be easily penetrated by new roots that are still fragile (Poerwanto and Susila, 2013). The polybag soil media needed is a type of soil that has good aerase and high nutritional content. Certain types of soil need to be treated to increase aerase through mixing by combining certain types of soil mixed with sand or organic matter (Duladi, 2013). The source of organic material can be in the form of manure.

Manure can be classified into organic fertilizers that have advantages. Some of the advantages of manure so that the farmers like it like improving soil structure and soil texture, increasing the absorption of soil to water, raising living conditions in the soil and as a source of food substances for plants (Dermiyati, 2015).

This study aims to determine the vegetative growth rate of bougenvile cuttings on PGR and manure treatment in polybags.

RESEARCH METHODS

This research was conducted in Mentimun Street, Siumbut Baru Village, Kisaran Timur Subdistrict, Asahan Regency, North Sumatera Province. Research time from March to May 2017.

This research was arranged based on Factorial Randomized Block Design with 2 treatment factors and 3 replications. The first factor is PGR with 4 levels: Z0 = without PGR, Z1 = Rootone F (2 g / l water), Z2 = Atonik (2 ml / l water) and Z3 = Hantu (2 ml / l water). The second factor is by giving the ratio of manure with 4 levels ie K0 = 1: 0 (1 part of soil + 0 parts of manure), K1 = 1: 1 (1 part of soil + 1 part manure), K2 = 2: 1 (2 part of soil + 1 part manure) and K3 = 3: 1 (3 parts of soil + 1 part manure).

RESULTS AND DISCUSSION

Plant Height (cm)

From the analysis of variance it can be seen that the application of PGR showed a significant effect on plant height at 4 weeks after planting (WAP), and has a very significant effect at ages 5 and 6 WAP. The application of manure showed no significant effect on plant height at 4 WAP, but significantly affected at ages 5 and 6 WAP. The interaction of PGR and manure showed no significant effect on plant height on all ages.

Different test results for the average application of PGR and manure on plant height of bougenvile cuttings aged 6 WAP can be seen in table 1 below.

Table 1. Test Results for the Difference in the Average Application of PGR and Manure Fertilizer On Plant Height (cm) of Bougenvile Cuttings Age 6 WAP.

P/M	Z_0	Z_1	Z_2	Z_3	Average
K_0	14.3	24.11	19.98	21.26	19.92 b
K_1	22.71	27.1	24.29	25.08	24.79 a
K_2	18.78	27.97	26.37	27.24	25.09 a
K_3	14.15	26.25	20.56	24.76	21.43 ab
Average	17.49 b	26.36 a	22.80 a	24.59 a	CV: 20.21%

Description: the numbers followed by the same letter in the same row or column show no significant difference at the 5% level using the LSD test.

In Table 1 it can be seen that the giving of PGR with Rootone F (Z1) treatment has the highest plant height of 26.36 cm, not significantly different from the treatment of Hantu (Z3) which is 24.59 cm and Atonik (Z2) treatment which is 22.80 cm However, it was significantly different from the control treatment (Z0) which was 17.49 cm, while Z3 was not significantly different from Z2 but was significantly different from Z0, as well as Z2 and Z0 showed significant differences between each other. The effect of manure on the planting medium with a ratio of 2: 1 (K2) has the highest plant height of 25.09 cm, not significantly different from the ratio of 1; 1 (K1) which is 24.79 cm, and a ratio of 3; 1 (K3) that is 21.43 cm, but significantly different from the control treatment (K0), which is 19.92 cm, while K1 is not significantly different from K3 but is significantly different from K0, but K3 and K0 show no significant differences between each other.

Number of leaves (strands)

Base from analysis of variance can be seen that the application of PGR showed a very significant effect on the number of leaves on all ages observed. The application of manure showed no significant effect on the number of leaves aged 4 WAP, but the effect was very significant on ages 5 and 6 WAP. The interaction of PGR and manure showed no significant effect on the number of leaves on all ages.

Different test results for the average PGR and manure application on the number of bougenvile cuttings leaves aged 6 WAP can be seen in Table 2 below.

Table 2. Different test results for the average PGR and manure application on the number of bougenvile cuttings leaves aged 6 WAP

P/M	Z_0	Z_1	Z_2	Z_3	Average
K_0	8.00	12.00	11.50	12.83	11.08 b
K_1	10.67	14.50	14.33	12.67	13.04 a
K_2	11.67	15.00	13.67	13.83	13.54 a
K_3	10.83	13.33	12.83	14.17	12.79 a
Average	10.29 b	13.71 a	13.08 a	13.38 a	CV: 13.18%

Description: the numbers followed by the same letter in the same row or column show no significant difference at the 5% level using the LSD test.

Table 2 shown that the application of PGR with Rootone F (Z1) treatment has the highest number of leaves, which is 13.71 strands, not significantly different from the treatment of Hantu (Z3) which is 13.38 strands and Atonik (Z2) treatment, which is 13.08 strands However, it was significantly different from the control treatment (Z0) which was 10.29 strands, while Z3 was not significantly different from Z2 but significantly different from Z0, as well as Z2 and Z0 showed significant differences between each other. The effect of manure on the cultivating medium with a

ratio of 2: 1 (K2) has the highest number of leaves, which is 13.54 strands, not significantly different from the ratio of 1; 1 (K1) which is 13.04 strands, and comparison 3; 1 (K3) that is 12.79 strands, but significantly different from the control treatment (K0) which is 11.08 strands, while K1 is not significantly different from K3 but is significantly different from K0, as well as K3 and K0 show significant differences between each other. The interaction of PGR and manure showed no significant effect on all treatment combinations.

Stem diameter (mm)

From the analysis of variance it can be seen that the application of PGR showed a very significant effect on stem diameter aged 4, 5 and 6 WAP. The application of manure showed a significant effect on the diameter of the stem aged 4 WAP, but the effect was very significant at ages 5 and 6 WAP. The interaction of PGR and manure showed no significant effect on stem diameter on all ages.

Different test results for the average of PGR and manure application on bougenvile cuttings stem diameter at 6 WAP can be seen in table 3 below.

Table 3. Different test results for the average of PGR and manure application on bougenvile cuttings stem diameter at 6 WAP (mm)

P/M	Z_0	Z_1	Z_2	Z_3	Average
K_0	3.67	4.17	4.25	4.58	4.17 b
K_1	3.92	6	5.5	5	5.10 a
K_2	4.42	5.5	5.25	5.83	5.25 a
K_3	3.75	5.5	4.83	5	4.77 ab
Average	3.94 b	5.29 a	4.96 a	5.10 a	CV: 13.13%

Description: the numbers followed by the same letter in the same row or column show no significant difference at the 5% level using the LSD test.

Table 3 shown that the application of PGR with Rootone F (Z1) treatment has the largest stem diameter of 5.29 mm, not significantly different from Hantu (Z3) treatment of 5.10 mm and Atonik (Z2) treatment of 4.96 mm However, it was significantly different from the control treatment (Z0) which was 3.94 mm, while Z3 was not significantly different from Z2 but significantly different from Z0, so Z2 and Z0 showed significant differences between each other. The effect of manure on the cultivating medium with a ratio of 2: 1 (K2) has the largest stem diameter of 5.25 mm, not significantly different from the ratio of 1; 1 (K1) which is 5.10 mm, and a ratio of 3; 1 (K3) that is 4.77 mm, but significantly different from the control treatment (K0) which is 4.17 mm, while K1 is not significantly different from K3 but is significantly different from K0, but K3 and K0 show different realities between each other. The interaction of PGR and manure showed no significant effect on all treatment combinations.

Number of live plants (plants)

From the analysis of variance it can be seen that the application of PGR shows a very significant effect on the number of live plants. The application of manure shown a significant effect on the number of live plants. The interaction of PGR and manure showed no significant effect on the number of live plants.

Different test results for the average PGR and manure application on the number of live plant bougenvile cuttings can be seen in Table 4 below.

Table 4. Different test results for the average PGR and manure application on the number of live plant bougenvile cuttings

P/M	Z_0	Z_1	Z_2	Z_3	Average
K_0	1.67	3.67	2.33	3.33	2.75 b
K_1	2.67	4.00	3.33	4.00	3.50 a
K_2	3.00	3.67	4.00	4.00	3.67 a
K_3	2.00	3.67	2.33	3.33	2.83 ab
Average	2.33 b	3.75 a	3.00 ab	3.67 a	CV: 26.74%

Description: the numbers followed by the same letter in the same row or column show no significant difference at the 5% level using the LSD test.

Table 4 shown that the application of PGR with Rootone F (Z1) treatment has the highest number of live plants, which is 3.75 plants, not significantly different from the treatment of Hantu (Z3) which is 3.67 plants and Atonik (Z2) treatment is 3.00 plants, but significantly different from the control treatment (Z0) which is 2.33 plants, whereas Z3 is not significantly different from Z2 but significantly different from Z0, but Z2 is not significantly different from Z0. The effect of manure on the cultivating medium with a ratio of 2; 1 (K2) has the highest number of live plants, which is 3.67 plants, not significantly different from the ratio of 1; 1 (K1) which is 3.50 plants, and comparison 3; 1 (K3) is 2.83 plants, but it is significantly different from the control treatment (K0) which is 2.75 plants, while K1 is not significantly different from K3 but is significantly different from K0, but K3 and K0 show different differences each other. The interaction of PGR and manure showed no significant effect on all treatment combinations.

CONCLUSSION

1. The best treatment for PGR was obtained on PGR Rootone F which resulted in plant height of 26.36 cm, number of leaves 13.71 strands, stem diameter of 5.29 mm, number of live plants of 3.75 plants.
2. The treatment of manure on the cultivating medium with a ratio of 2: 1 (soil: manure) is the best treatment that produces a plant height of 25.09 cm, number of leaves 13.54 strands, stem diameter of 5.25 mm, number of living plants 3, 67 plants.
3. The interaction between PGR and manure has no significant effect on all observational variables.

REFERENCES

Aisyah. 2016. Aplikasi Berbagai Jenis Zat Pengatur Tumbuh (PGR) Terhadap Pertumbuhan Semai Gaharu (Aquilaria malaccensis Lamk.). Jurnal Fakultas Pertanian Universitas Riau.

Alif, M.I. 2015. Pembungaan Bugenvil Bunga Putih Dengan Rekayasa Zat Penghambat Tumbuh Dan Media Tanam Pada Lingkungan Berpolusi Udara. Fakultas Pertanian Institut Pertanian Bogor. Bogor.

Ansoruddin. Safruddin. Sinaga, Robinson. 2017. Respon Pertumbuhan dan Produksi Tanaman Selada Merah (*Red Lettuce*) Terhadap Pemberian Bokashi Eceng Gondok dan Bokashi Ampas Tebu. Bernas

Chairani. Zulia, Cik. Sandi, Ari. 2017. Respon Pertumbuhan dan Produksi Tanaman Kacang Panjang Buncis (*Phaseolus vulgaris* L.) Terhadap Pemberian EM4 dan Beberapa Macam Pupuk kandang. Bernas

Dermiyati. 2015. Sistem Pertanian Organik Berkelanjutan. Plantaxia. Yogyakarta.

Duladi. 2013. Panduan Lengkap Pembibitan Jabon. IPB Press. Bogor.

Goldsworthy, P.G., Fisher,N.M.,2006. Fisiologi Tanaman Budidaya Tropik. Gajah Mada University Press. Yogyakarta.

Hatta, M., Hasinah H., dan Suryani. 2006. Pengujian Media Tanam dan Pupuk ME-17 Pada Pertumbuhan Bibit Kakao. Jurnal Fakultas Pertanian, Unsyiah.

Hidayati, S. dan H. Halim. 2012. Pemanfaatan Pupuk Organik Cair dan Pupuk Kandang Pada Pertumbuhan dan Hasil Tanaman Mentimun Jepang (Cucumis sativus). Jurnal Fakultas Pertanian Universitas Merdeka. Surabaya.

Haridjaja, O., Y. Hidayat, L.S. Maryam. 2010. Pengaruh Bobot Isi Tanah Terhadap Sifat Fisik Tanah dan Perkecambahan Benih Kacang Tanah dan Kedelai. Jurnal Ilmu Pertanian.

Latunra, A.I., E. Tambaru, M.A. Salam, dan E.W. Ferial. 2014. Buku Ajar, Struktur dan Perkembangan Tumbuhan. Universitas Hasanuddin. Makasar.

Lindung. 2013. Teknologi Pembuatan dan Aplikasi Bakteri Pemacu Pertumbuhan Tanaman (PGPR) dan Zat Pengatur Tumbuh (PGR). http://bppjambi.info/newspopup.asp?id=589. Accessed on 9th March 2017.

Lingga, P. Dan Marsono. 2013. Petunjuk Penggunaan Pupuk. Edisi Revisi. Penebar Swadaya. Jakarta.

Mahfudz, Isnaini dan H. Moko. 2006. Pengaruh Zat Pengatur Tumbuh dan Media Tanam Terhadap Pertumbuhan Stek Pucuk Merbau. Jurnal Penelitian Hutan Tanaman. Vol. 3 No.1.

Ma'ruf, Amar. Hartati, RM. Andayani, Neni. 2018. Effect of Cutting Material Selection and Intensity of Sunlight Radiation On Growth of *Mucuna bracteata* Seedling. Agricultura

Ma'ruf, Amar. Zulia, Cik. Safruddin. 2017. Rice Estate Development as State Owned Enterprises (SOEs) to Self Supporting for Food. European Academic Research

MasAd. 2016. Bunga Kertas – Pengertian, Klasifikasi Dan Jenis-Jenis Bunga Kertas. Diakses Tanggal 9 Maret 2017.

Messakh, O.S. dan Sudarma, I.K. 2007. Posisi Mata Tunas Batang Atas dan Konsentrasi IAA Terhadap Pertumbuhan Grafting Bougenvillea Spectabilis dengan Bougenvillea Variegata. Politeknik Pertanian Negeri Kupang. Kupang.

Mulyani, H. 2014. Buku Ajar Kajian Teori dan Aplikasi Optimasi Perancangan Model Pengomposan. Trans Info Media. Jakarta.

Panjaitan, L.R.H.. 2014. Respons Pertumbuhan Berbagai Ukuran Diameter Batang Stek Bugenvil (Bougainvillea spectabilisWilld.) Terhadap Pemberian Zat Pengatur Tumbuh. Jurnal. Fakultas Pertanian Universitas Sumatera Utara.

Poerwanto, R. dan Susila, A.D. 2013. Teknologi Hortikultura. IPB Press. Bogor.

Sinaga, Apresus. Ma'ruf, Amar. 2016. Tanggapan Hasil Pertumbuhan Tanaman Jagung Akibat Pemberian Pupuk Urea, SP-36 dan KCL. Bernas

Sunyoto dan Liza, O. 2013. Peranan PGR Pada Pertumbuhan Stek Tanaman Buah Naga. Jurnal Balai Penelitian Tanaman Buah Tropika.

Susetya, D. 2013. Panduan Lengkap Membuat Pupuk Organik. Pustaka Baru Press. Jakarta.

Sutanto, R. 2002. Penerapan pertanian organik: pemasyarakatan dan Pengembangannya. Kanisius. Jakarta.

Widyawati, A.T. 2014. Pengaruh Konsentrasi Pupuk Organik Cair Dan Penggunaan Mulsa Plastik Terhadap Pertumbuhan Dan Hasil Tanaman Cabai. Balai Pengkajian Teknologi Pertanian (BPTP) Kalimantan Timur.

Zulia, Cik. Safruddin. Zulfahmi, Anggi. 2017. Pengaruh Pemberian Pupuk Organik Bio-7 dan Pupuk NPK Alam Tani Terhadap Pertumbuhan dan Produksi Tanaman Kacang Panjang (*Vigna sinensis.* L.). Bernas

Wiyanto, Gimo. Ma'ruf, Amar. Sartik, Resa. 2014. Panen Rupiah dari Ladang Jahe. Bhafana Publishing